

1 CLAIMS:

2 What is claimed is:

3 1. A method comprising:

4 obtaining a digitized image to be protected by a watermark;

5 specifying a digitized bounding rectangle having known horizontal  
6 and vertical dimensions;

7 forming a resized image by resizing the horizontal dimension by a  
8 horizontal factor and the vertical dimension by a vertical  
9 factor, so that the resized image is a largest replica of said  
10 digitized image fitting entirely within the bounding rectangle;  
11 and

12 imbedding said watermark into said resized image to form a  
13 watermarked image.

14 2. A method as recited in claim 1, further comprising forming at  
15 least one derivative copy of said watermarked image, each copy  
16 preserving the ratio of horizontal dimension to vertical  
17 dimension as nearly as practicable.

18 3. A method as recited in claim 1, wherein the horizontal factor  
19 and the vertical factor are equal.

20 4. A method as recited in claim 1, wherein both the horizontal  
21 factor and the vertical factor are greater than 0.125.

22 5. An article of manufacture comprising a computer usable medium

1 having computer readable program code means embodied therein for  
2 causing watermark insertion, the computer readable program code  
3 means in said article of manufacture comprising computer readable  
4 program code means for causing a computer to effect the steps of  
5 claim 1.

6 6. A program storage device readable by machine, tangibly  
7 embodying a program of instructions executable by the machine to  
8 perform method steps for watermarking, said method steps  
9 comprising the steps of claim 1.

10 7. An apparatus comprising:

11 means for obtaining a digitized image to be protected by a  
12 watermark;

13 means for specifying a digitized bounding rectangle having known  
14 horizontal and vertical dimensions;

15 means for forming a resized image by resizing the horizontal and  
16 vertical dimensions of said image by a common factor, so that the  
17 resized image is a largest replica of said digitized image  
18 fitting entirely within the bounding rectangle; and

19 means for imbedding said watermark into said resized image to  
20 form a watermarked image.

21 8. An apparatus as recited in claim 7, further comprising means  
22 for forming at least one derivative copy of said watermarked  
23 image, each copy preserving the ratio of horizontal dimension to  
24 vertical dimension as nearly as practicable.

25 9. A computer program product comprising a computer usable medium

1 having computer readable program code means embodied therein for  
2 causing watermark insertion, the computer readable program code  
3 means in said computer program product comprising computer  
4 readable program code means for causing a computer to effect the  
5 functions of claim 7.

6 10. A method comprising inserting a watermark into at least one  
7 derivative image, including the steps of:

8 providing a source digital image having at least one image  
9 plane, each said image plane being represented by an array  
10 having pixel brightness data for a plurality of pixels, each  
11 of said pixels having at least one color component and  
12 having a pixel position;

13 specifying horizontal and vertical dimensions of a bounding  
14 rectangle;

15 resizing the source image by enlargement or reduction of its  
16 horizontal and vertical dimensions to form an adjusted image  
17 so that the resized image is a largest replica of said  
18 digitized image fitting entirely within the bounding  
19 rectangle;

20 inserting into said adjusted digital image an invisible  
21 image watermark; and

22 producing at least one derived image by resizing the  
23 watermarked adjusted image.

1 11. An article of manufacture comprising a computer usable medium  
2 having computer readable program code means embodied therein for  
3 causing watermark insertion, the computer readable program code  
4 means in said article of manufacture comprising computer readable  
5 program code means for causing a computer to effect the steps of  
6 claim 10.

7 12. A method comprising inserting a watermark into at least one  
8 derived image, including the steps of:

9 providing a source digital image having at least one image  
10 plane, each said image plane being represented by an array  
11 having pixel brightness data for a plurality of pixels, each  
12 of said pixels having at least one color component and  
13 having a pixel position;

14 specifying the horizontal and vertical dimensions of a  
15 bounding rectangle,

16 determining an enlargement or reduction first factor **f1**  
17 that, if applied, would resize the source image by  
18 enlargement or reduction of its horizontal and vertical  
19 dimensions so that the resized image is a largest replica of  
20 said digitized image fitting entirely within the bounding  
21 rectangle;

22 forming an adjusted invisible image watermark that is  
23 enlarged of reduced by a second factor **f2**;

24 resizing the source image by enlargement or reduction of its  
25 horizontal and vertical dimensions by a combined factor, **f1**  
26 times **f2**, to form an alternative adjusted digital image.

1 13. A method as recited in claim 12, further comprising inserting  
2 into said alternative adjusted digital image said adjusted  
3 invisible image watermark.

4 14. A method as recited in claim 1, wherein the factor **f2** is  
5 greater than 0.1.

6 15. An article of manufacture comprising a computer usable medium  
7 having computer readable program code means embodied therein for  
8 causing watermark insertion, the computer readable program code  
9 means in said article of manufacture comprising computer readable  
10 program code means for causing a computer to effect the steps of  
11 claim 12.

12 16. A program storage device readable by machine, tangibly  
13 embodying a program of instructions executable by the machine to  
14 perform method steps for watermarking, said method steps  
15 comprising the steps of claim 12.

16 17. A method comprising detecting a watermark imbedded in a  
17 candidate image employing a bounding rectangle, including the  
18 steps of:

19 recalling dimensions of the bounding rectangle used to produce a  
20 resized source image from which the candidate image was produced;

21 forming a resized image by resizing the horizontal and vertical  
22 dimensions of said candidate image by a common factor, so that  
23 the resized image is a largest replica of said candidate image  
24 fitting entirely within the bounding rectangle;

25 reproducing the watermark suspected of being in the candidate  
26 image; and

1 attempting detection of the watermark in the candidate image.

2 18. A method as recited in claim 17, further comprising employing  
3 results obtained from the step of attempting.

4 19. A method as recited in claim 16, wherein the step of  
5 employing includes determining if said candidate is a derivative  
6 copy of said source image.

7 20. An article of manufacture comprising a computer usable medium  
8 having computer readable program code means embodied therein for  
9 causing watermark detection, the computer readable program code  
10 means in said article of manufacture comprising computer readable  
11 program code means for causing a computer to effect the steps of  
12 claim 17.

13 21. A program storage device readable by machine, tangibly  
14 embodying a program of instructions executable by the machine to  
15 perform method steps for detecting a watermark, said method steps  
16 comprising the steps of claim 17.